

OCTOBER 6, 1887.

Nine persons present. President Howard in the chair.

Mr. Ashmead read the following paper:

A PROPOSED NATURAL ARRANGEMENT OF THE HYMENOPTEROUS
FAMILIES.

BY WM. H. ASHMEAD.

A natural arrangement of the divisions and families of the Hymenoptera, according to my views, differs so materially from that proposed by Mr. E. T. Cresson in his recent excellent work, "Synopsis of the Families and Genera of the N. A. Hymenoptera," that this early opportunity is taken to draw attention to them while that work is fresh before the entomological world.

The division of the order into two sections—*Hymen. ditrocha* and *Hymen. monotrocha*—is, I think, a natural one; but the arrangement of the families by Mr. Cresson is, in some respects, very unnatural, and fails to show their relationship.

The section *monotrocha* I consider to contain the highest types of the order, and hold with Dr. A. S. Packard that, among the family *Apidæ*, are found the most highly specialized forms.

Beginning therefore with this family, I think a very natural sequence of the families can be shown leading into the *Hymenoptera ditrocha* as follows:

HYMEN. MONOTROCHA.

ANTHOPHILA.	{	Apidæ
	{	Andrenidæ
DIPLOPTERYGIA.	{	Masaridæ
	{	Eumenidæ
	{	Vespidæ
	{	Crabronidæ
	{	Pemphredonidæ
	{	Mellinidæ
	{	Philanthidæ
	{	Nyssonidæ
	{	Bembecidæ
	{	Larridæ
FOSSORES.	{	Ampulicidæ
	{	Pompilidæ
	{	Peleciniidæ
	{	Sphecidæ
	{	Scoliidæ
	{	Sapygidæ
	{	Mutillidæ

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HETEROGYNA.	{	Myrmicidæ
		Odontomachidæ
		Poneridæ
	}	Formicidæ
TUBULIFERA.		Chrysididæ

It will be seen that the anomalous family, *Pelecniidæ*, is assigned a position between the *Pompilidæ* and the *Sphecidæ*.

Mr. Cresson placed it temporarily near *Ichneumonidæ*, but it cannot belong there, the trochanters being one-jointed, a fact to which Mr. Cresson calls special attention. It seems to me to be allied to the long-bodied Sphecids, *Ammophilæ*, and a position is assigned the family near them.

Prof. Packard has, somewhere, called attention to the fact that the male *Pelecinus* resembles the genus *Trypoxylon* in the family Crabronidæ. That this anomalous family belongs somewhere in this section, I think cannot be questioned.

The families *Mutillidæ* and *Chrysididæ* lead naturally into the *Hymen. ditrocha*, through closely allied forms in the family *Proctotrupidæ*, and for which reason that family is placed at the head of that section.

For the section *Hymen. ditrocha* the divisions first proposed by St. Fargeau are preferred to those made use of by Mr. Cresson, for they enable the presentation of a much more natural sequence of the families than could otherwise be given.

They are as follows :

HYMEN. DITROCHA.

- Ovipositor consisting of a single horny piece issuing from the tip of the abdomen, CANALIFERA.
 Ovipositor spiral or semi-spiral, retractile when at rest, . . . SPIRIFERA.
 Ovipositor of two horny, saw-like pieces, SERRIFERA.
 Ovipositor partly lodged at rest in an external sheath from beneath some distance from apex of abdomen, TERESELLIFERA.

According to these divisions the families in this section would be arranged as follows :

CANALIFERA.	{	Proctotrupidæ		Proctotrupinæ
		Helorinæ		Sceleoninæ
		Dryininæ		Platygasterinæ
		Emboleminæ		Belytinæ
		Bethylinæ		Diapriinæ
		Ceraphroninæ		
SPIRIFERA.	{	Cynipidæ		SEC. 2: Gymnogastræ
		SEC. 1: Cryptogastræ		Inquilinæ
		Eucoilinæ		Cynipinæ
		Figitinæ		Ibaliinæ
		Allotriinæ		Orysidæ

SERRIFERA.		{ Cephidæ Tenthredinidæ	
TEREBELLIFERA.	Siricidæ		Aphelininæ
	Braconidæ		* *
	Ichneumonidæ		Pireninæ
	Trigonalidæ		Tridyminæ
	Stephanidæ		Spalanginæ
	Evanidæ		Blastophaginæ
	Chalcididæ		Pteromalinæ
	SEC. 1: Macrocentri		
	*	SEC. 2: Microcentri	
	Eucharinæ		Tetracampinæ
	Perilampinæ		Elachistinæ
	Eurytominæ		Elasminæ
	Aximinæ		Eulophinæ
	Chalcidinæ		Entedoninæ
	Leucospidinæ		Tetrastichinæ
	Toryminæ		*
	Eupelminæ		Trichogramminæ
	Encyrtinæ		
		Mymaridæ m.	

It will be seen that the *Mymarinae* have been removed from the family *Proctotrupidæ*; the ovipositor does not issue from the apex of the abdomen, and they have other characters that exclude them from that group. The English hymenopterist, A. H. Haliday, many years ago, recognized this fact and placed them among the *Chalcididæ*; but his views, apparently, were not accepted, for all late systematists let them remain undisturbed among the *Proctotrupidæ*. From a study of several of the genera I feel convinced Mr. Haliday was nearly right in placing them with the *Chalcididæ*.

Among them are the smallest and most degraded hymenopters known and, while allied in habits to the *Chalcididæ*, in structure they offer characters that seem to me to entitle them to family rank.

In venation and the fore wings of some of them there is a remarkable resemblance to certain forms among the *Trichogramminæ*, the lowest group of the *Chalcididæ*, and I have therefore assigned them a position after that group.

The following table may be used to separate these three families:

Hind wings linear,	PROCTOTRUPIDÆ
Hind wings not linear;	
ovipositor issuing from the extreme tip of abdomen,	PROCTOTRUPIDÆ
ovipositor issuing from the middle of venter,	CHALCIDIDÆ
2. Ovipositor issuing subapically,	MYMARIDÆ, *

With the *Mymarinae* removed the *Proctotrupidæ* form a natural group closely connected with the parasitic *Cynipidæ* through the *Diapriinæ* and *Eucoilinæ*.

The *Cynipidæ* through the *Ibaliinæ* and *Oryssidæ* connect with the *Tenthredinidæ*, and a natural sequence of the other families follows, as is shown in the arrangement of the families above given.

The *Braconidæ* seem to me to be more closely allied to certain saw-flies, and in consequence are placed above the *Ichneumonidæ*.

Both of these families need revision, and no effort is made to arrange the subfamilies.

The *Ichneumonidæ* connect naturally then through the *Trigonalidæ* and *Stephanidæ* with the *Evaniidæ*, and the latter lead naturally into the *Chalcididæ* through the genus *Hyptia* and the Eucharid genus *Lophyrocera* Cameron, a species of which I have taken in Florida and named in MS. *L. floridana*.

The sequence of the subfamilies in the *Chalcididæ* as arranged above seems to be a very natural one. so gradually do they merge the one into the other.

The *Eucharinæ*, *Perilampinæ* and *Eurytominae* are very closely allied, and the last through *Aximinae* form a very close connection with the *Chalcidinae*, *Toryminæ* and the following groups.

I am by no means satisfied that *Axima* is entitled to subfamily rank; it seems to me to belong to the Eurytomid group.

The *Blastophagæ*, or fig insects, Francis Walker placed in the *Proctotrupidæ*; according to Sir Sidney Saunders, they form a section in the *Cynipidæ*; while Prof. J. O. Westwood says they belong to the *Chalcididæ*. At present engaged in preparing a monograph of the N. A. Cynipidæ, I was very desirous of satisfying myself on this point, and fortunately have been able to do so, from a study of possibly an undescribed species, now in the U. S. Department of Agriculture, recently collected by Mr. E. A. Schwarz, on *Ficus aurea* in South Florida.

The species studied evidently belongs to Saunders' genus *Kradibia*, which Dr. Mayr, in his "Feigen-insecten," says is identical with *Blastophaga* Grav.; at any rate it is no Cynips, and I agree with Prof. Westwood in considering the *Blastophagæ* as a group in the *Chalcididæ*.

They seem most closely allied to the *Spalanginæ* and a position is assigned them next to that subfamily.

In conclusion, I beg to say that the views herein set forth are based upon a tolerably close study of most of the families mentioned, all being known to me in nature but two—*Mellinidæ* and *Ampulicidæ*.

In discussing this paper Mr. Howard stated that it appeared to him that Mr. Ashmead's arrangement was, in the main, a one-character classification, and that no natural classification should be attempted without a thorough review of many characters. The ovipositor is an important organ, and its variations should have much weight, but an arrangement of the families according to such variations will clear up but a single factor in the problem.

Mr. Howard also took strong exception to the placing of the subfamily *Mymarinae* among the *Chalcididae*, calling attention to the pronotal characters as having great weight in retaining it with the *Proctotrupidae*. The resemblance of the venational characters to those of the *Trichogramminae* he considered of little value, and cited the resemblance in the venation with certain *Scelioninae* to that of many *Chalcididae* as much more striking. He also stated that while, under the microscope, the ovipositor with the *Mymarinae* apparently arises near the base of the abdomen, this appearance may be due to the great transparency of the abdomen with this group, and that on careful study it may possibly be found to *issue* from the tip, as with other *Proctotrupidae*.

Dr. Fox related the following observation :

NOTE ON A NEW PARASITE OF CAMPONOTUS PENNSYLVANICUS.

By W. H. Fox, M. D.

During the past summer it was my good fortune to meet with the larval form of an interesting and peculiar parasite of the common black ant (*Camponotus pennsylvanicus*).

About the middle of July, while sitting on the front steps of a house in Hollis, New Hampshire, I noticed several decapitated bodies of the black ant which still retained the power of motion. Being curious to know what had become of the heads, I instituted a search, and was rewarded by finding several of them. To my surprise, the heads also seemed to have the power of motion; but this was easily explained on a little closer scrutiny. Each head was found to be inhabited by a white grub, which completely filled the cranial cavity. The articulation of the mouth parts had been destroyed, and the appendages had fallen off, leaving an opening through which the larva could protrude its anterior extremity. So completely had the contents of the head been destroyed that, upon the removal of the larva, the eyes of the ant were seen to be transparent, and the articulations of the antennae showed as two light spots. The mode of motion of the larva was simple but interesting. The head of the ant was kept on its flat, or posterior, surface, and the larva took a firm hold on the wood of the steps, close to the mouth opening; then, by elongating itself, it pushed its domicile in the opposite direction as far as possible; then, loosening its hold, contracted, and began again. The rate of travel was very slow, for I have left one for over half an hour and found it again, on my return, within a couple of feet of the spot where it was left. As to the mature form of this insect I know nothing, not even the order to which it belongs. A few of the larvae are presented for examination, and several have been kept in some earth in the hope that I can get the imago from them next summer. I would say that I have also found this parasite in the head before the latter had

become detached from the body of the ant, showing that the egg had been deposited in the living host. Hoping to be able to clear this subject up more fully at some future time, I must leave it as it stands for the present.*

Mr. Lugger read the following paper :

A NEW METHOD OF PRESERVING TRANSPARENT AQUATIC INSECTS
FOR THE MICROSCOPE.

By O. LUGGER.

The study of transparent aquatic larvæ of the various orders of insects is both amusing and instructive. For the former purpose a common life-cell is all that is required, and many a pleasant hour can be spent with the microscope in contemplating the beauties of these delicate objects. The whole of the internal anatomy and the workings of the various organs can be studied with ease. But for the more serious work the life-cell alone is not sufficient. The object to be studied will soon die under these unnatural conditions for lack of air, and it is often difficult, if not impossible, to substitute a second specimen for the dead and now opaque object. Even if careful drawings have been prepared of the still transparent larva, it is all-important to preserve the object in such a manner that it can always be consulted at any future time.

Various, more or less successful, methods have been invented, but all have proven futile after a short time; the preserved specimens either shrink out of all proportions or they become opaque and useless.

Some time ago I received by exchange a slide prepared by Mr. Dunker, of Berlin. He succeeded in inventing a method of preparing the lower animals and plants found in standing water in a perfectly natural condition. Infusoria, small Algæ, Rhizopods, Flagellates, Ciliates, Chlorophyllaceæ, Desmids, Diatoms, Daphnia, and Cyclops species were thus prepared by him and sold in large numbers. However, Mr. Dunker has shown very little liberality in this matter, and keeps his method a secret. When I received the slide I concluded to sacrifice it, hoping to be able to discover his method. I broke the cover-glass, and immediately I perceived the odor of something familiar, and related to the cheap alcohol made of wood. The substance is Rectified Wood-vinegar (*Acetum pyrolignosum rectificatum*). Many experiments during the last three months convinced me that this is the preserving material long desired. Of course, I do not know whether Mr. Dunker uses the same simple material or a compound in which it occurs.

A neat and very useful cell for mounting aquatic specimens was shown

* Mr. Howard, in a paper read before the Biological Society of Washington, October 22, 1887, stated that this parasitic larva probably belongs to the Dipterous family *Conopidae*, the larvæ of one or more species of which have been found in Europe to be parasitic in the abdomen of *Bombus*, *Osmia*, *Odynerus*, and *Pompilus*.